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Title: Attachment as a partial mediator of the relationship between emotional abuse and schizotypy

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Abstract

Developmental theories highlight the salience of attachment theory in explaining vulnerability towards psychosis. At the same time there is increasing recognition that psychosis is associated with childhood trauma variables. This study explored the interaction between attachment and several trauma variables in relation to schizotypy levels in a non-clinical sample. 283 non-clinical participants completed online measures of schizotypy, attachment, childhood abuse and neglect. When five types of abuse/neglect were entered into a linear regression analysis emotional abuse was the sole independent predictor of schizotypy. Age, attachment anxiety and avoidance were independent predictors after the effects of emotional abuse were controlled for. The overall model was significant, explaining 34% of the variation in schizotypy. Moderation analysis indicated that the effect of emotional abuse was not conditional upon attachment. Parallel mediation analysis indicated small but significant indirect effects of emotional abuse on schizotypy through attachment avoidance (13%) and attachment anxiety (8%). We conclude that emotional abuse contributes to vulnerability towards psychosis both directly and indirectly through attachment insecurity.

Keywords: schizotypy, attachment, trauma, emotional abuse, psychosis, mediation

1. Introduction

Increasingly, attachment theory is being employed as a theoretical framework for explaining how traumatic experiences in childhood are related to psychopathology generally and, specifically, to psychosis-proneness (Mikulincer and Shaver, 2012; Gumley et al., 2014). Current conceptualisations of psychosis support the notion of continuous distribution of subclinical psychotic symptoms in the general population, a concept known as schizotypy (Johns and Van Os, 2001; Stefanis et al., 2002), and converging evidence from both non-clinical and clinical samples provides support for an association between insecure attachment and schizotypy (Berry et al., 2006; Meins et al., 2008; Tiliopoulos and Goodall, 2009).

Vulnerability towards the development of psychosis may be best understood within a context of attachment-influenced affect regulation systems (Gumley et al., 2014), where insecure attachment is associated with poor strategies for responding to, and regulating, distress. This vulnerability may be manifest via a number of different mechanisms such as dysfunctional cognitive models, heightened physiological responding and lowered thresholds for perceiving stress (Maunder et al., 2006; Mikulincer and Shaver, 2012; Lataster et al., 2013). Adult attachment is commonly measured on two orthogonal dimensions of attachment insecurity (Fraley et al., 2000). These dimensions are associated with specific patterns of goal – congruent cognitions and responses in the face of distress. The avoidance dimension is associated with compulsive independence, denial or non-recognition of emotional response and a suppressive regulation strategy, while the anxiety dimension is associated with a cognitive model of vulnerability, compulsive threat monitoring and exaggeration of negative affect (Diamond et al., 2006; Mikulincer and Shaver, 2007; Goodall et al., 2012). Both avoidant and anxious attachment insecurity are associated with schizotypal symptoms and

therefore psychosis-proneness in both clinical and non-clinical populations (Korver-Nieberg et al., 2014; Sheinbaum et al., 2014).

It is also increasingly evident that traumatic childhood experiences play a significant role in the development and maintenance of psychosis (Varese et al., 2012; Matheson et al., 2013). Numerous studies have indicated an over-representation of sexual abuse and childhood physical abuse in clinical patients with psychosis symptoms (e.g. Yen et al., 2002; Read et al., 2005). Studies that have included more common types of traumatic experience have, however, indicated that neglect and emotional abuse may be more powerfully related to schizotypal symptoms than sexual or physical abuse (Johnson et al., 2000; Powers et al., 2011). There is therefore a growing interest in investigating the differential effects of specific abuse and neglect variables and furthermore, how these variables interact with attachment to increase vulnerability towards psychosis.

The interaction between attachment and adversity has often been conceptualized from a resilience perspective where secure attachment is posited to act as a buffer against adverse childhood experiences such as abuse and neglect (Sroufe, 2005), whilst insecure attachment has been conceptualized as a risk factor which amplifies the effect of other risk factors (Mikulincer and Shaver, 2007). An alternative hypothesis is that abuse or neglect in childhood would prevent the development of a secure attachment representation thus the relationship between trauma and schizotypy may be partially or wholly mediated by attachment. A small number of studies have investigated the interaction of attachment and trauma variables in relation to schizotypy. Berry and colleagues (2007) found that adult attachment style predicted specific symptoms when the effects of trauma were controlled for, which further emphasizes the importance of attachment in specifying the development of

psychosis. Further specification of how these factors interact is warranted. Previous studies have demonstrated that attachment mediates the relationship between schizotypy and composite measures of sexual abuse and neglect (Sitko et al., 2014) and physical/emotional trauma (Sheinbaum et al., 2014) however it is recognized that the dynamics and effects of specific types of adversity may differ (Sheinbaum et al., 2014).

The aim of the present study was twofold: firstly to compare the effects of emotional abuse, emotional neglect, physical abuse and physical neglect on schizotypal symptoms and secondly to determine the role of attachment in relation to identified associations. We hypothesised that, in line with previous research, emotional abuse and neglect would be more strongly predictive of schizotypy levels than sexual or physical abuse. A second aim of the study was to investigate whether attachment moderates or mediates the relationship between identified variables and schizotypy in order to further explore the mechanisms through which childhood adversity interacts with attachment.

2. Methods

2.1 Participants and procedure

Prospective participants were contacted via the university email system and through social media sites. They were provided with a link for an online survey site hosted by the Bristol Online Survey. The survey opened with an information page and consent was indicated by clicking on an 'I agree' button. 283 participants completed the online survey (age range 18-74 years; mean = 26.8, SD = 9.28 years). Participants were mainly female (72%) and mainly students (58 %). Ethical approval was obtained through the University ethics procedure.

2.2 Materials

The online survey comprised three standardized psychometric assessments, measuring the following concepts:

2.2.1 Adult attachment

The Experiences in Close Relationships Questionnaire – Revised (ECR-R; Fraley et al., 2000) is self-report assessment of adult attachment on two orthogonal dimensions of anxiety and avoidance. It comprises 36-items, rated on a seven point Likert type scale ranging from 1 (strongly disagree) to 7 (strongly agree), with half of the items loading on each assessed dimension. Low scores denote attachment security. The scale has good internal reliability, with reported alpha coefficient values of 0.90 or higher for both sub scales (Fairchild and Finney, 2006). In the current study the alpha coefficient for both subscales was 0.92.

2.2.2 Childhood abuse and neglect

The Childhood Trauma Questionnaire (Bernstein and Fink, 1998) is a 25-item self-report measure that assesses 5 different types of childhood trauma: physical, sexual and emotional abuse, and physical and emotional neglect. Statements are rated on a 5-point scales ranging from “Never true” to “Very often true.” Thus higher scores reflect more instances of trauma. Normative internal consistency and test-retest reliabilities range from 0.80 to 0.83 (Bernstein and Fink, 1998; Bernstein et al., 1994). In the current study, the Cronbach alpha coefficient was 0.82.

2.2.3 Schizotypy

The SPQ-B (Raine and Benishay, 1995) is a 22-item, yes/no format self-report measure of schizotypy that is based on the 74-item full version of the SPQ (Raine, 1991). It comprises 3 subscales: Cognitive-Perceptual (8 items), Interpersonal (8 items), and Disorganization (6 items) and, a total score is obtained. Higher scores reflect higher levels of schizotypy. The Cronbach's α internal consistency reliability coefficient for the total scores in this study was 0.84 –similar to that of Raine and Benishay, 1995).

3. Results

3.1 Descriptive statistics

This was a non-clinical sample therefore all of the childhood abuse and neglect variables exhibited positive skew, with relatively few high values being reported. Other variables were distributed normally. Independent t-tests indicated that there were no significant sex differences for any of the study variables. The percentage of participants who reported trauma of any level was: emotional abuse 90%; emotional neglect 88%; physical abuse 61%; physical neglect 57%; sexual abuse 15%.

3.2 Associations between study variables

As some of the CTQ variables were non-normally distributed, Spearman's rho correlations for the main variables are presented in Table 1. Table 1 shows that schizotypy total scores were positively associated with all abuse/neglect variables. The largest association was with

emotional abuse (0.42, $p < 0.001$). As expected, schizotypy showed significant positive associations with attachment anxiety (0.43, $p < 0.001$) and avoidance (0.38, $p < 0.001$).

There were significant positive associations between trauma variables and attachment. Both attachment anxiety and attachment avoidance were associated with all trauma variables with the exception of physical abuse.

There were small but positive associations between age and emotional neglect (0.19, $p = 0.001$) suggesting that older participants report higher levels of neglect. Age showed small negative correlations with schizotypy (-0.15, $p = 0.013$) and attachment anxiety (-0.25, $p < 0.001$) and attachment avoidance (-0.18, $p = 0.002$), suggesting that reported attachment insecurity and schizotypy reduce with age.

Table 1 here

3.3 Moderation analysis

In order to specify a model of trauma and attachment multivariable regression was employed to: i) assess the association of five different types of childhood trauma in relation to schizotypy, ii) examine the importance of attachment in explaining the variance in schizotypy when the effects of age and trauma are controlled for, and iii) determine whether attachment moderates the effect of significant trauma predictors. The results are depicted in table 2. Age was controlled for at step 1. At step 2, emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect were entered. A significant model emerged ($F(6, 276) = 16.25, p < 0.001$). From the trauma variables, only emotional abuse emerged as an

independent predictor of schizotypy. Attachment variables were entered at step 3. The model was significant ($F(8, 274) = 19.42, p < 0.001$) with a significant 10% increase in R^2 . The total variance in schizotypy explained by the model was 34%. Independent predictors were age ($0.16, p = 0.003$), emotional abuse ($0.28, p < 0.001$) attachment anxiety ($0.24, p < 0.001$) and attachment avoidance ($0.16, p = 0.006$). At step 4, attachment was examined as a moderator of the relation between emotional abuse and schizotypy. The addition of the interactions (emotional abuse x anxiety and emotional abuse x avoidance) did not explain a significant increase in schizotypy ($\Delta R^2 = 0.00, F(10, 272) = 15.53, p < 0.001$). Thus aside from being independent predictors neither attachment anxiety nor avoidance had any influence on the strength or direction of the relationship between emotional abuse and schizotypy.

Table 2 here

3.3 Parallel mediation analysis

Whereas moderation alludes to the combined effect of two variables on an outcome, mediation refers to a situation where the relationship between predictor variable and an outcome variable can be explained, wholly or partially by their relationship to a third variable. Mediation analysis was conducted to investigate the role of attachment insecurity in the mechanism by which the greater the trauma (emotional abuse) the greater the psychosis phenotype (schizotypy). A parallel multiple mediator model was tested, using a conditional process modelling programme PROCESS which utilises an ordinary least squares based path analytical framework to test for both direct and indirect effects (Hayes, 2012). Parallel mediation analysis allows for simultaneous testing for more than one mediator while accounting for the shared association between them. This is of particular relevance to

dimensional measures of attachment where attachment dimensions are associated but not causally related. The statistical significance of indirect and mediating effects was assessed using bootstrapped bias-corrected percentile based confidence intervals, based on 1000 bootstrap draws. If zero was not within the 95% confidence intervals, the mediating/indirect effect was considered to be significant.

Figure 1 represents the paths in the mediation model. The regression coefficients between emotional abuse and attachment avoidance and anxiety were statistically significant, 0.04 (95% CI 0.02, 0.07) and 0.05 (95% CI 0.02, 0.08) respectively, indicating that higher emotional abuse is associated with higher attachment avoidance and anxiety. Similarly, the regression coefficients between schizotypy and attachment avoidance and anxiety were significant, 0.81 (95% CI 0.30, 1.31) and 1.13 (95% CI 0.66, 1.61) respectively, indicating that higher attachment insecurity is related to higher schizotypy. The combined effects of emotional abuse, attachment anxiety and avoidance accounted for 33% of the variance in schizotypy ($F(3,279) = 45.23, p = 0.001$).

Figure 1 here

The results of the parallel mediation analysis, in table 3, reveal that the relationship between emotional abuse and schizotypy was mediated by attachment avoidance (partial mediation, 8%) and attachment anxiety (partial mediation 13%). The total effect, the relationship between emotional abuse and schizotypy in the absence of the mediators was significant, 0.44 (95% CI, 0.33, 0.55). The direct effect, the relationship between emotional abuse and schizotypy, controlling for attachment was still significant, 0.35 (95% CI (0.24, 0.45). The indirect effects were statistically significant, through attachment avoidance 0.04 (95% CI 0.01, 0.08) and anxiety 0.06 (95% CI 0.02, 0.11), indicating a mediating effect of both

attachment insecurity dimensions. These represent relatively small effects $\kappa^2 = 0.06$ (95% CI 0.02, 0.11) and $\kappa^2 = 0.08$ (CI, 0.04, 0.13) respectively, and it is also important to note that emotional abuse influenced schizotypy independently of its effect on attachment avoidance and anxiety, 0.35 (95% CI, 0.24, 0.45). Thus while both attachment dimensions partially mediate the relationship between emotional abuse and schizotypy, with anxiety exerting a greater effect, emotional abuse still independently influences schizotypy.

Table 3 here

4. Discussion

To our knowledge this is the first study to compare the independent effects of a full range of abuse/neglect variables on schizotypy and subsequently to examine possible moderating and mediating effects of attachment on identified relationships. As expected this study found significant associations between schizotypy and both dimensions of attachment insecurity as well as all trauma variables at the univariable level. Regression analysis demonstrated that when all abuse and neglect variables were simultaneously entered into a model, only emotional abuse emerged as an independent predictor of schizotypy. Sexual and physical abuse/neglect and emotional neglect were not independent predictors of schizotypy. This differential effect held even after attachment dimensions were entered; in fact emotional abuse was a stronger predictor of schizotypy than either attachment anxiety or avoidance. The combined effects of attachment and emotional abuse predicted more than one third of the variance in schizotypy. This finding is in line with those of previous research that has indicated that emotional abuse or verbal abuse may be of particular relevance to schizotypal symptoms (e.g. Berenbaum, et al., 2008, Johnson et al. 2001; Powers et al., 2011).

It is worth reiterating that, in this non-clinical sample, the majority of participants did not report sexual or physical abuse, which might partly explain why these variables were not independent predictors when entered alongside emotional abuse. However, emotional abuse may be more representative of enduring and consistent abuse than sexual and physical abuse, which may be viewed as individual abusive acts. In addition, emotional abuse has been shown to heighten the effect of other types of abuse (Edwards et al., 2003). Thus emotional abuse may be conceptualized as an undercurrent of dysfunctional relations and behaviours. Janssen et al. (2004) indicated that a dose-response relationship exists between childhood abuse and psychosis, with the risk of developing a psychosis outcome increasing with increased frequency of reported abuse, and no increased risk in those reporting the lowest levels of abuse. In this study however, emotional abuse was predictive of schizotypy even in a low-risk sample with low reported rates of sexual and physical abuse. Rates of reported emotional abuse in the sample indicated that it is relatively common, with 44% of the sample reporting abuse greater than 'minimal' and 21% reported experiencing moderate to extreme emotional abuse (according to CTQ cutoff points). Thus, particularly for individuals who have not experienced sexual or physical abuse, emotional abuse may be of relevance for the development of vulnerability to psychosis.

A second aim of this study was to investigate the nature of the role attachment plays in the relationship between emotional abuse and schizotypy. The role of attachment in the development of psychopathology is often viewed from a resilience perspective (Rutten et al., 2013) where insecure attachment is posited to act as an additive risk factor. In this study, the moderation analysis indicated that, aside from being independent predictors, neither attachment anxiety nor avoidance had any influence on the strength or direction of the relationship between emotional abuse and schizotypy. There is no indication then, that

specific levels of attachment insecurity are required in order for emotional abuse to exert an effect on schizotypy or vice versa.

We further investigated the possibility that the relationship between emotional abuse and schizotypy can be explained through insecure attachment. Parallel mediation analysis demonstrated a small partial mediating effect of attachment avoidance and anxiety on the relationship between emotional abuse and schizotypy. Thus the relationship between emotional abuse and schizotypy can be partially explained by the finding that those who have been emotionally abused are also more likely to be insecurely attached. Whilst it is not possible to provide a causal interpretation, conceptually this finding fits with the theoretical position that insecure attachment arises from insensitive or non-contingent early interactions. Attachment anxiety was stronger predictor than attachment avoidance, suggesting that representations and behaviours that underpin attachment anxiety may potentially be of particular relevance to the relationship between emotional abuse and schizotypy. This finding is in line with the idea that emotional abuse is representative of generally dysfunctional relational backgrounds. In addition, attachment was shown to be a partial mediator, suggesting that other variables are likely to mediate this relationship.

This finding has implications for clinical practice. Our results suggest that individuals who score highly on the schizotypal scale have had increased experiences of emotional abuse and it is therefore important to assess for all trauma types as well as an attachment history, when devising a treatment plan.

The primary limitation of this study is the use of cross-sectional and retrospective data, which limits determination of causality between the study variables. It could also be argued that self-report data is likely to have low validity; in fact studies suggest that retrospective reporting of childhood trauma is concordant with other sources of information even in

individuals experiencing psychosis (Fisher et al., 2011). Furthermore a meta-analysis of case-control, prospective and epidemiological studies demonstrated that similar odds ratios of exposure to childhood adverse experiences regardless of study design, thereby providing reassurance about the validity of retrospective designs (Varese et al., 2012a). The strengths of this study include firstly examining the contribution of several types of abuse and trauma as many studies have relied on composite measures and secondly examining both the moderating and mediating effects of attachment in order to specify more clearly the nature of the role of attachment in the relationship between emotional abuse and schizotypy.

Finally, the relationship between emotional abuse and schizotypy has been relatively neglected in comparison to other types of abuse and varying definitions of emotional abuse have been used across studies. Johnson et al (2001) have suggested that verbal abuse may be of particular relevance to schizotypy however emotional abuse comprises also non-verbal behaviour such as spurning and isolating (Brassard and Donovan, 2006). Inclusion of a full range of emotional abuse measures would facilitate further specification of pathways that potentially contribute to psychosis-proneness through other potential mediating factors such as loneliness or self-esteem.

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Table 1
Descriptive statistics and Spearman's Rho among main variables ($n = 283$)

	1	2	3	4	5	6	7	8	9	M	SD
1.Schizotypy	1									8.98	5.07
2. Age	-.15*	1								26.76	9.28
3.Attachment anxiety	.43**	-	1							3.35	1.22
4. Attachment avoidance	.38**	-	.25**	1						3.02	1.14
5.Emotional abuse	.42**	.07	.26**	.23**	1					9.42	4.86
6. Emotional neglect	.30**	.19**	.19**	.21**	.63**	1				9.96	4.72
7. Physical abuse	.20**	.07	.00	.11	.54**	.35**	1			6.74	3.39
8. Physical neglect	.33**	.10	.13*	.25**	.58**	.64**	.44**	1		7.25	2.88
9. Sexual abuse	.13*	.09	.17**	.14*	.42**	.27**	.26**	.29**	1	6.23	3.79

* $p < 0.05$, ** $p < 0.01$,

Figure 1

Parallel mediation model

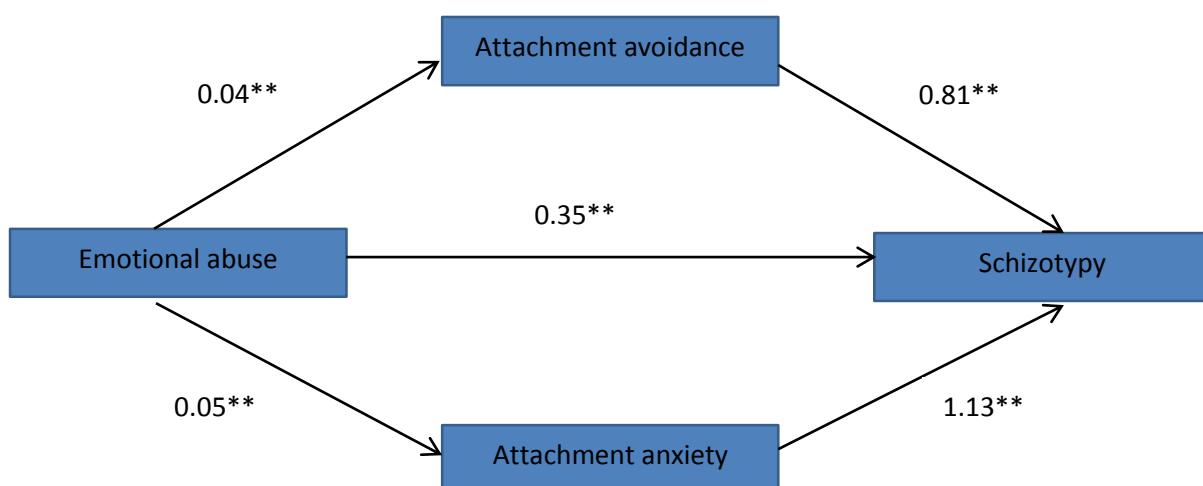


Table 2
Linear model of predictors and moderators of schizotypy ($n = 283$)

	<i>Adjusted R^2</i>	ΔR^2	β	<i>95% CI</i>	
				<i>LL</i>	<i>UL</i>
<i>Step 1</i>	0.04	0.04			
Age			-0.20**	-0.17	-0.05
<i>Step 2</i>	0.24	0.22			
Age			-0.25***	-0.20	-0.08
Emotional abuse			0.36***	0.20	0.54
Physical abuse			-0.16	-0.38	0.04
Sexual abuse			-0.04	-0.21	0.09
Emotional neglect			0.11	-0.03	0.28
Physical neglect			0.14	0.01	0.51
<i>Step 3</i>	0.34	0.10			
Age			-0.16**	-0.14	-0.03
Emotional abuse			0.28***	0.13	0.46
Physical abuse			-0.03	-0.24	0.16
Sexual abuse			-0.08	-0.24	0.04
Emotional neglect			0.05	-0.09	0.20
Physical neglect			0.13	-0.02	0.46
Attachment anxiety			0.24***	0.53	1.50
Attachment avoidance			0.16**	0.20	1.20
<i>Step 4</i>	0.34	0.00			
Age			-0.16**	-0.14	-0.03
Emotional abuse			0.40*	0.05	0.79
Physical abuse			-0.03	-0.25	0.16
Sexual abuse			-0.08	-0.24	0.04
Emotional neglect			0.06	-0.09	0.21
Physical neglect			0.12	-0.03	0.46
Attachment anxiety			0.25	-0.02	2.11
Attachment avoidance			0.24	-0.13	2.21
Anxiety x emotional abuse			-0.02	-0.10	0.10
Avoidance x emotional abuse			-0.14	-0.15	0.07

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 3

Parallel multiple mediation analysis examining the indirect effects of emotional abuse on schizotypy via attachment anxiety and avoidance ($n = 283$).

	Unstandardized parameter estimate	SE	95% bias-corrected confidence interval
Total effect	0.44	0.6	0.33, 0.55
Direct effect	0.35	0.5	0.24, 0.45
Indirect total effect	0.09	0.03	0.04, 0.16
Indirect effect via anxiety	0.06	0.02	0.02, 0.11
Indirect effect via avoidance	0.04	0.02	0.01, 0.08